

Ventilator Associated Pneumonia Care Bundle (VAP)



West Yorkshire
Critical Care & Major Trauma
Operational Delivery Networks

VAP

“Ventilator-associated pneumonia (VAP) in a critically ill patient significantly increases risk of mortality and, at a minimum, increases ventilator time, length of stay, and cost of care. It is a complex condition not only to diagnose but also to treat, thus prevention is extremely important”

Institute for Healthcare Improvement (2007)

<http://www.ihc.org/Topics/VAP/Pages/default.aspx>



West Yorkshire
Critical Care & Major Trauma
Operational Delivery Networks

Definition of VAP

Ventilator-associated pneumonia (VAP) is defined as pneumonia that occurs 48-72 hours or thereafter following endotracheal intubation, characterized by the presence of a new or progressive infiltrate, signs of systemic infection (fever, altered white blood cell count), changes in sputum characteristics, and detection of a causative agent [1].

1. American Thoracic Society, Infectious Diseases Society of America: Guidelines for the management of adults with hospital-acquired, ventilator-associated, and healthcare-associated pneumonia. Am J Respir Crit Care Med 2005, 171: 388-416.



Impact

- VAP is estimated to occur in 9-27 % of all mechanically ventilated patients, with the highest risk being early in the course of hospitalization³
- Studies have placed the attributable mortality for VAP at between 33-50 %, but this rate is variable and relies heavily on the underlying medical illness⁴
- VAP is the second most common nosocomial infection in the intensive care unit and the most common in mechanically ventilated patients⁵
- VAP increases length of ICU stay by 28%⁶

3. Chastre J, Fagon JY: State of the art: ventilator-associated pneumonia. *Am J Respir Crit Care Med* 2002, 165: 867-903

4. American Thoracic Society, Infectious Diseases Society of America: Guidelines for the management of adults with hospital-acquired, ventilator-associated, and healthcare-associated pneumonia. *Am J Respir Crit Care Med* 2005, 171: 388-416.

5. Hunter JD: Ventilator associated pneumonia. *BMJ* 2012, 344: e3325. [10.1136/bmj.e3325](https://doi.org/10.1136/bmj.e3325)

6. Nosocomial pneumonia: incidence, morbidity and mortality in the intubated-ventilated patient. Pittett 1994

Risk Factors

- Mechanical ventilation with Endotracheal intubation including Tracheostomy
- Prolonged mechanical ventilation
- Advanced age
- Pre-existing sinusitis and lung disease
- Micro or macro-aspiration of oropharyngeal or gastric contents
- Malnutrition and immunosuppression
- Obesity
- Chronic lung disease



Radiology signs

- 2 or more serial chest x-rays with at least one of the following
 - New or progressive and persistent infiltrate
 - Consolidation
 - Cavitation



Clinical signs

At least one of the following:

- Fever (temperature $> 38^{\circ}\text{C}$ with no other recognised cause)
- Leucocytosis $> 12000\text{WCC}/\mu\text{L}$ or leucopenia ($<4000\text{WCC}/\mu\text{L}$)
- For adults 70 years or older, altered mental status with no other recognisable cause

and at least 2 of the following:

- New onset of purulent sputum, or change in character of sputum, or increased respiratory secretions, or increased suctioning requirements
- New-onset or worsening cough, or dyspnoea or tachypnoea
- Bronchial breath sounds
- Worsening gas exchange (e.g. O_2 desaturations [$\text{PaO}_2/\text{FiO}_2 \leq 240$], increased O_2 requirements, or increased ventilation demand)



Microbiological criteria (optional)

- Positive growth in blood culture not related to another source of infection
- Positive growth in culture of pleural fluid
- Positive quantitative culture from bronchoalveolar lavage ($\geq 10^4$ colony forming units/ml) or protected specimen brushing ($\geq 10^3$ colony forming units/ml)
- 5% or more of cells with intracellular bacteria on direct microscopic examination of Gram-stained bronchoalveolar lavage fluid
- Histopathological evidence of pneumonia



Elements of VAP Bundle



Elements of the VAP bundle (2016)

Subglottic Suction (Endotracheal/Tracheostomy) used in patients anticipated to be ventilated >72 hours

Ventilated Patients tracheally intubated patients, maintain cuff pressure 20-30cm (optimally 25cmH₂O)

Cuff Pressure measurements Minimum 4-6 Hours and following significant patient movement (transfer, turn etc.)

Daily Sedation Hold (unless contraindicated) or based on target RASS

Patients Nursed in Semi-recumbent position (unless contraindicated) >30°

Ventilator Tubing and Suction systems changed only if specifically indicated, soiling etc. (or in conjunction with manufacturers guidelines).

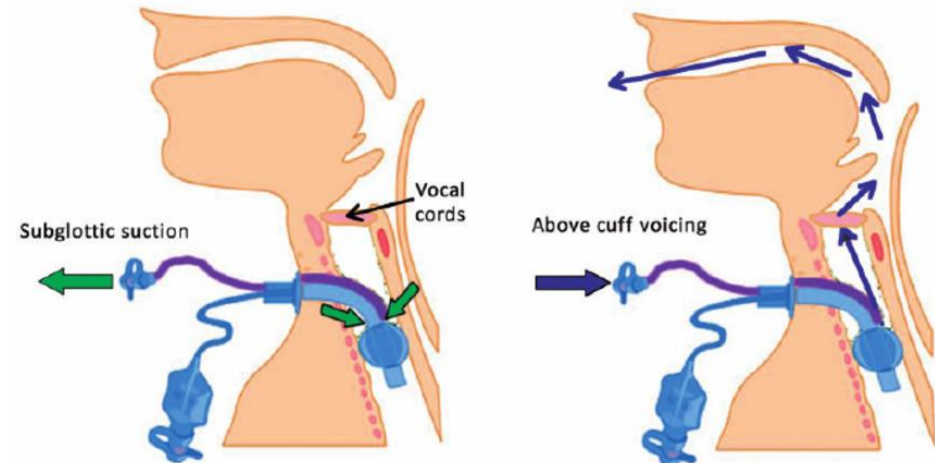
Stress Ulcer Prophylaxis should be used only in patients considered to be 'at risk' of upper gastrointestinal bleeding. If prescribed review regularly and specifically when enteral feed is established.

Regular Oral hygiene. Oral Care should be assessed according to risk.

Subglottic Suction

Subglottic Suction (Endotracheal/Tracheostomy) to be used in patients anticipated to be ventilated >72 hours

- Secretions potentially can bypass cuff – deflated or inflated
- Pooling of secretions above ETT but below Vocal Cords
- Conventional suction catheters cannot access this area
- Subglottic Suction Drainage has a consistent positive impact on VAP



Cuff Pressure

Mechanically-ventilated patients should be intubated with an orotracheal tube or tracheostomy should have cuff pressure maintained between 20-30 cmH₂O (optimally 25cmH₂O)

Cuff pressure measurements should be carried out every 4-6 hours as a minimum and following any significant movement of the patient i.e. transfer, mobilisation

- Potential micro-aspiration can be reduced by cuff pressure 20-30cmH₂O
- Checked 4 – 6 hourly
- Individual assessment
- Rationale for cuff pressure outside the guideline should be documented



Sedation Hold

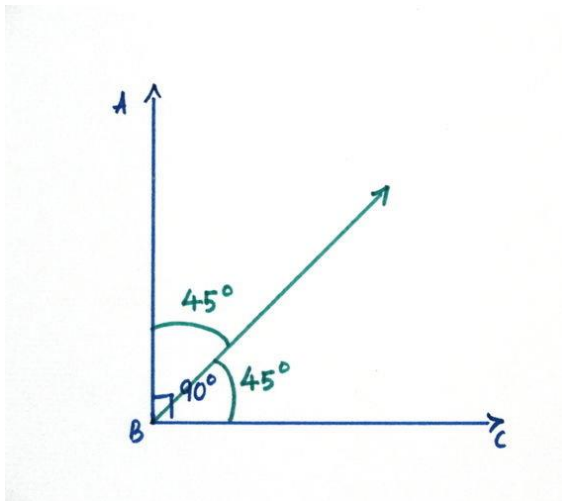
Daily Sedation Hold (unless contraindicated) or based on target RASS

- Over Sedation (direct or accumulated) can increase ventilator days predisposing to VAP
- Targeted RASS or Daily Sedation Interruption or hold used to promote spontaneous breathing is an effective combined strategy to reduce risk of VAP
- Clinical status and assessment should be rationale and documented.

Semi-recumbent Position

Patients should be nursed in a semi-recumbent position (>30 degrees) unless contraindicated

- Reduces the risk of aspiration.
- 45° is best but not practical for the mechanically ventilated patient
- 30° is recommended to avoid supine position



Avoid Ventilator Circuit Changes

Ventilator tubing and suction systems should only be changed if specifically indicated, such as by visible soiling, to avoid unnecessary changes (in conjunction with manufacturers recommendations)

- Humidified gases condense in the tubing promoting pathogens growth
- Accidental inhalation during manipulation of the tube is possible.
- Change only if clinically indicated or as per standard operating procedure
- Adds to further cost reduction



Stress Ulcer Prophylaxis (SUP)

Stress ulcer prophylaxis should be used judiciously, and only in patients considered to be at high risk of upper gastrointestinal (GI) bleeding. If a patient is prescribed SUP this should be reviewed regularly and specifically when enteral feeding is established

- Increased incidence of VAP weighed against SUP
- Insufficient evidence to support use of SUP
- Assess risk of GI bleed patient by patient use SUP where indicated and essential against GI Bleed



Oral Hygiene

Regular oral hygiene should be maintained; oral care should be assessed and delivered according to identified risk

- Use of oral chlorhexidine is no longer advocated as a routine practice for critical care patients with the exception of cardiac surgery patients
- Oral hygiene remains a positive preventative measure against dental caries and gingivitis in the ventilated patients and should be undertaken regularly



Review and Audit

- Compliance to the VAP care bundle will be audited monthly
- Reports produced quarterly

